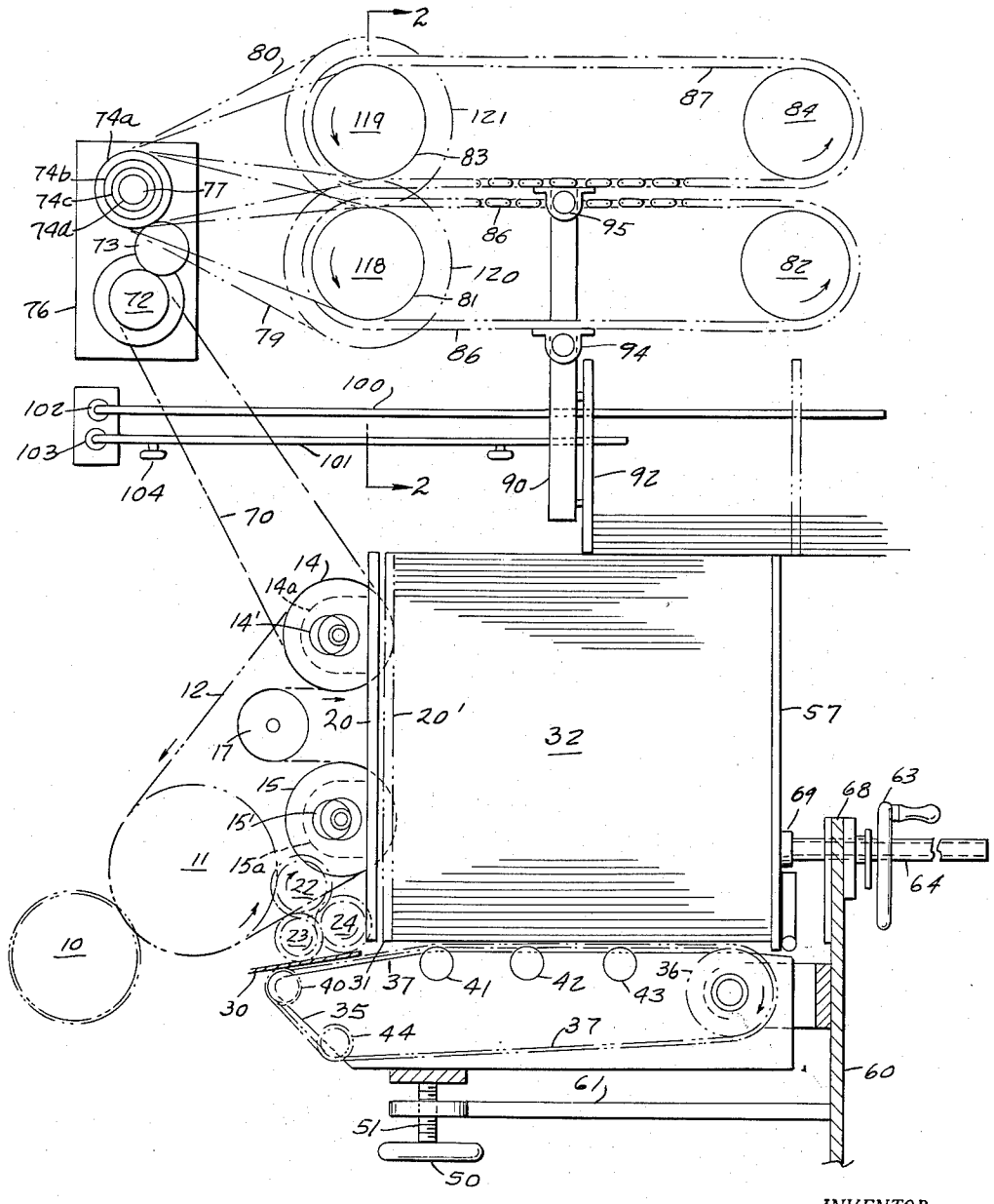
June 13, 1961 A. F. SHIELDS 2,988,236

BLANK STACKING, STRAIGHTENING AND DELIVERY DEVICE

Filed Dec. 4, 1956 2 Sheets-Sheet 1

FIG. 1




INVENTOR.
ALBERT F. SHIELDS

BY Ostrolenk, Faber, Gerb & Soffen

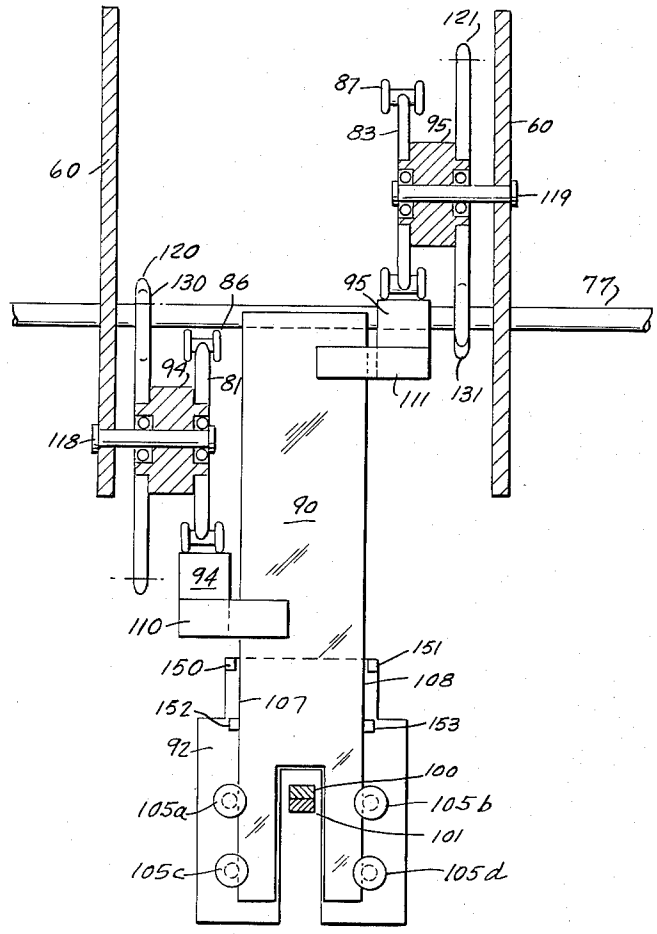
ATTORNEYS

June 13, 1961 A. F. SHIELDS 2,988,236

BLANK STACKING, STRAIGHTENING AND DELIVERY DEVICE

Filed Dec. 4, 1956 2 Sheets-Sheet 2

FIG. 2.




INVENTOR.
ALBERT F. SHIELDS

BY Ostrolenk, Faber, Gerb & Soffen

ATTORNEYS

United States Patent Office 2,988,236
Patented June 13, 1961



2,988,236

# BLANK STACKING, STRAIGHTENING, AND DELIVERY DEVICE

Albert F. Shields, Forest Hills, N.Y., assignor to S & S Corrugated Paper Machinery Company, Inc., Brooklyn, N.Y., a corporation of New York

Filed Dec. 4, 1956, Ser. No. 626,100
5 Claims. (Cl. 214—6)

This invention relates to a blank stacking, straightening and delivery device and, more particularly, to a device for piling, straightening and accurately delivering box blanks issuing from a machine adapted to operate on the blanks such as a folding machine or slotting creasing machine.

The device of the present invention finds particular application in instances where box blanks are operated on rapidly and must be subsequently delivered rapidly to the next processing operating without the necessity uneconomical hand operations.

In acordance with the present invention this result is obtained by combining, in a single automatic device, which is readily synchronized with the movement of the machine for operating on the box blanks, a combined stacking, straightening and delivering device in which a plurality of blanks are stacked from below and, periodically, a pile of blanks is removed from the top of the stack. By the time the stack is delivered from this device they have been properly aligned mechanically through the use of a novel straightening mechanism hereinafter set forth in more detail.

Accordingly it is an object of the present invention to provide a combined blank stacking, straightening and delivery device which is rapid, accurate and minimizes the necessity for hand operations.

Another object of the present invention is to provide a stacking, straightening and delivery device which is readily synchronized with a machine which operates on such blanks and allows the ultimate issuance from the said machine of a stack having a predetermined number of properly aligned box blanks.

These and other objects of the present invention will become more apparent when taken in connection with the following description and the drawings in which:

FIGURE 1 is a side elevation of the mechanism of the present invention showing how the blanks are received, stacked, straightened and delivered.

FIGURE 2 is a cross-section of the device which delivers a stack of blanks from the machine of the present invention and is taken along the lines 2—2 of FIGURE 1 looking in the direction of the arrows.

Essentially the present invention involves a mechanism particularly adapted for use in connection with machines which operate on box blanks such as slotting and creasing machines, folding machines or other similar machines well known to the art. This invention has particular utility in stacking and straightening inaccurately folded blanks and by employing the underfeeding technique hereindisclosed there is always sufficient pressure maintained within the stack to allow for complete gluing of the folded blanks. The delivery mechanism herein disclosed will obviously be useful on both folded and unfolded blanks.

The mechanism herein contemplated includes a conveyor operable in synchronization with the machine which has previously worked upon the box blanks, and a stacking and straightening device above the said conveyor comprising means transverse to the direction of motion of the blanks and between which is accumulated a stack of the said blanks. The stack accumulating portion of the present invention would include two plates, one having an opening thereunder sufficient to permit the entry of at least one blank at a time and another plate which is adapted to about the front end of the stack of blanks. Means are provided for oscillatorily operating the former plate in a longitudinal direction and which motion imparts to this plate a slapper action and thereby provides a means for aligning the stack of blanks.



The two plates between which the stack is confined are open at the upper end and a longitudinally movable plate for periodically pushing a stack of said blanks from the upper end of the accumulating device is provided so that the lowermost edge of the pusher plate will clear the uppermost edge of the transverse plate abutting the front end of the stack of blanks. The blank pushing mechanism is also operated in synchronism with the conveying means, but the blanks are fed into the present device and are further supported so that when in contact with the blanks it remains in substantially vertical position. Flexible longitudinally extending hold-down bars are also provided so as to prevent dislocation of the top of the stack until delivery of the blanks therefrom.

Referring now to the drawings in more detail, power is supplied to the machine through gear **10** which is also coordinated with the movement of the folding, slotting and creasing, or other machine from which the blanks issue. This, in turn, drives sprocketed wheel **11** which carries a chain **12** therewith. The chain moving in the direction of the arrows drives the wheels **14** and **15** interconnected by idler **17**. Brackets **14***a*, **15***a* extending rearward from slapper plate **20** are mounted to eccentrics **14'**, **15'**, respectively, which are mounted to wheels **14**, **15**, respectively. These eccentrics cause a periodic reciprocating or longitudinal oscillatory movement of slapper plate **20** so that it ultimately moves from the position shown by the solid lines **20** to that illustrated by the dotted lines **20'**. This specific mechanism for causing oscillatory movement of slapper plate **20** is only, of course, exemplary of a preferred embodiment of this invention, and other mechanisms for causing this result would be apparent to those skilled in the art.

Through an appropriate gear mechanism illustrated by members **22**, **23** and **24** means are provided for conveying the box blank **30** forward underneath the space **31** below the slapper plate and thereby causes the stack **32** to be added to from underneath. The conveyor **35**, driven from wheel **36**, the movement of which is also coordinated with that of driver **10**, is sloped at section **37** thereof so as to allow the entry of blanks from underneath the stack **32**. The conveyor further rides on idler rolls **40**, **41**, **42** and **43** and **44**.

A height adjustment which is operated manually by wheel **50** is secured to the frame of the machine **60** and by adjustment of the threaded member **51** the space of entry of the blank into the stack may be accurately varied in accordance with the blank thickness. The threaded member **51** is supported by rigid frame extension **61**.

In order to adjust the machine for the proper length of blanks, hand wheel **63** is provided which controls the longitudinal position of plate **57** which in turn abuts the leading edge of each of the blanks in the stack. The adjustment of this plate is made by a movement of threaded member **64** which passes through the frame at **68** and is secured to plate **57** at **69**.

It is also apparent that wheel **14** carries a sprocket which in turn causes the chain **70** to be moved in coordination with the driver **10**. The chain in turn causes movement of driver **72** which through a series of internal gears, illustrated as **73**, is made to engage one of a plurality of gears **74***a*, *b*, *c* or *d*. This mechanism is encased in a gear box **76** and is illustrative of one well-known common gearing mechanism well known to the art for transmitting any one of a number of pre-selected gearing ratios.

The gear member 74 is secured to a shaft 77 which carries sprocket wheels 130, 131 engaged by chains 79 and 80, respectively, which in turn drive sprocket wheels 120 and 121, respectively. These two sprocket wheels are mounted on common shafts 118 and 119, respectively, which in turn drives sprockets 81 and 83. The chains 86 and 87 driven by these respective sprocket wheels are also carried by sprockets 82 and 84. These two chains provide means by which the plate support 90 and pusher plate 92 may be maintained in a substantially vertical position throughout the operation of the device and particularly through the entire time when the plate 92 contacts the rear edge of the blanks. This is accomplished by the support 90 secured to the chain 86 by a bushing 94, while at the same time the other transverse side of the plate support is secured to chain 87 by bushing 95.

The blanks in addition to being aligned by slapper plate 20 are maintained in alignment by means of a pair of flexible hold-down strips 100 and 101 which are rigidly secured to the frame of the machine at 102 and 103, respectively. The strip 101 is adjustable by means of a telescoping section (not shown) which is held in place by knobs 104 and by any other suitable means. Hold-down strips 100 and 101 maintain a downward pressure on stack 32 thereby maintaining the folds in the blanks of stack 32 during both the delivery and accumulating periods. During the delivery period when the stack being removed clears the free end of the shorter strip 101, the strip 101 is now in position to engage the top of the remaining stack as it advances upward. During this period the longer strip 100 remains in engagement with the top of the stack being removed.

The pusher plate, which operates in predetermined synchronization with the stacking and straightening device in order to periodically deliver a stack containing a given number of blanks, is vertically slidable by means of wheels 105*a*, *b*, *c* and *d*, mounted to pusher plate 92, which are adapted to ride on vertical rails 107 and 108, respectively, mounted to support plate 90. Thus, as pusher plate 92 delivers a pile of blanks from the machine, the stack is continuously rising and because of wheels 105*a*, *b*, *c* and *d* riding on rails 107 and 108 the pusher plate is made to rise in response to the movement of the top of the portion of the stack not being delivered. Thus the pusher plate does not interfere with the increasing stack even during the delivery period. A suitably positioned stop (not shown) is included to limit the downward movement of plate 92. In order that one side of the plate support 90 is secured to bushing 94 at 110, while the other side is secured at 111 to the bushing 95, the bushings have their respective shafts 118 and 119 which pass therethrough rigidly secured to the frame of the machine 60. Lugs 150, 151 projecting from pusher plate 92 are positioned to engage ears 152, 153 respectively, of support member 90 to thereby limit the downward movement of pusher plate 92.

In the foregoing, I have described my invention only in connection with preferred embodiments thereof. Many variations and modifications of the principles of my invention within the scope of the description herein are obvious. Accordingly, I prefer to be bound not by the specific disclosure herein, but only by the appending claims.

I claim:

1. A stacking, straightening and delivery mechanism adapted for use with a machine for operating on box blanks, comprising, a conveyor operable in synchronism with the said machine to move said blanks in a first, or longitudinal, direction, a device above the conveyor to intercept and accumulate blanks issuing from the machine thereby forming a blank stack being fed from below, said device including a pair of plates transverse to the direction of motion of the blanks between which the blanks may be accumulated; one of the said plates abutting the trailing edge of the blanks in the stack and being periodically reciprocally movable in a longitudinal direction to apply a straightening force to the blanks; an opening under said plate sufficient to permit the entry of at least one blank at a time, and above the upper end of said plates, a longitudinally movable plate for periodically pushing a top portion of the stack of said blanks from the said accumulating device and means for supporting the said pusher plate so that it remains in a substantially vertical position when in contact with the said blank stack, said pusher plate being mounted for limited vertical movement relative to the means for supporting the pusher plate, said stack being fed with blanks as the movable plate is removing said top portion from the stack.

2. The device as set forth in claim 1 including means for holding down the top of the remaining portion of the stack of blanks until delivery of the top portion of the said stack is completed and also exerting a hold-down force to the blanks remaining in the accumulating device during delivery of said stack.

3. A stacking, straightening and delivery mechanism adapted for use with a machine for operating box blanks, comprising a conveyor operable in synchronism with the said machine to move said blanks in a first or longitudinal direction, a device above the conveyor to intercept and accumulate blanks issuing from the machine, said device including straightening means comprising a pair of plates positioned transverse to the direction of motion of the blanks between which the blanks may be accumulated in a stack; one of the said plates abutting the trailing edge of the blanks in the stack and being periodically oscillatorily movable in a longitudinal direction; an opening under said plate sufficient to permit the entry of at least one blank at a time, and above the upper end of said plates a longitudinally movable vertically extending pusher plate for periodically pushing a top portion of said stack of said blanks from the said accumulating device while the bottom portion of said stack remains in said device, said pusher plate being operated in synchronism with said machine, said plate having the bottom edge thereof resting upon the top of said bottom portion of said stack while said top portion is being removed by said plate, said conveyor being timed to continue delivery of blanks to the bottom of said stack while said pusher plate is removing the top portion of the stack; a support plate carrying said pusher plate; said pusher plate being vertically movable relative to said support plate.

4. A stacking, straightening and delivery mechanism for transporting box blanks comprising a conveyor for moving the blanks in a first, or longitudinal, direction into the mechanism, straightening means comprising a pair of plates transverse to the direction of motion of the conveyor for confining a stack of blanks, one of the said plates abutting the trailing edge of the blanks in the stack and being periodically reciprocally movable in a longitudinal direction for aligning the blanks; a continuously movable pusher plate periodically engageable with a top portion of said stack for removal thereof, and a common drive means for synchronizing the movement of the said conveyor, said reciprocally movable plate, and said pusher plate so that the elements operate in a predetermined sequence, a support plate for maintaining said pusher plate substantially vertical at all times, said pusher plate mounted to said support plate for vertical movement relative thereto.

5. A stacking, straightening and delivery mechanism adapted for use with a machine for operating box blanks, comprising a conveyor operable in synchronism with the said machine to move said blanks in a first or longitudinal direction, a device above the conveyor to intercept and accumulate blanks issuing from the machine; said device comprising a first and a second means for engaging the blanks at the leading and trailing edges, respectively, thereof to thereby form a stack of blanks being fed from below; an opening under said second means suf-

ficient to permit the entry of at least one blank at a time, said device constructed and operated to apply a straightening force to the blanks in the stack, and above the upper end of said device a longitudinally movable vertically extending pusher plate for periodically pushing a top portion of said stack of said blanks from the said accumulating device while the bottom portion of said stack remains in said device, said pusher plate being operated in synchronism with said machine, said plate having the bottom edge thereof resting upon the top of said bottom portion of said plate, said conveyor being timed to continue delivery of blanks to the bottom of said stack while said pusher plate is removing the top portion of the stack; a support plate carrying said pusher plate; said pusher plate being vertically movable relative to said support plate.



**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 478,079 | Binkard | July 5, 1892 |
| 635,616 | Trevette | Oct. 24, 1899 |
| 739,121 | Taylor | Sept. 15, 1903 |
| 1,344,034 | Hart | June 22, 1920 |
| 1,755,884 | Lowd | Apr. 22, 1930 |
| 1,819,841 | Hudson | Aug. 18, 1931 |
| 1,868,384 | Greenwood | July 19, 1932 |
| 2,135,773 | Sheppard | Nov. 8, 1938 |
| 2,315,670 | Tascher | Apr. 6, 1943 |
| 2,410,380 | Jamieson et al. | Oct. 29, 1946 |
| 2,591,259 | Hess | Apr. 1, 1952 |
| 2,672,079 | Chandler | Mar. 16, 1954 |
| 2,708,863 | Payne | May 24, 1955 |
| 2,789,067 | Link | Apr. 16, 1957 |
| 2,823,811 | Temple | Feb. 18, 1958 |
| 2,853,299 | Link et al. | Sept. 23, 1958 |